2001 PIPING PLOVER BREEDING ACTIVITIES
CAPE HATTERAS NATIONAL SEASHORE

Cape Hatteras National Seashore (CAHA) continued to oversee Piping Plover (Charadrius melodus) breeding management during the year 2001. The project could not have been completed without the daily assistance of volunteers Lisa Goshe, Kelley Shutt and Meaghan Shipley. Their work, in part, was supported by a contribution from the North Carolina Beach Buggy Association.

Efforts in 2001 included: 1) locating breeding plovers and nests, 2) protecting territories and nests, 3) monitoring nests and broods.

Location of Breeding Plovers and Nest

Beginning in early April, beaches were surveyed for plover activity. These surveys included sites that had been previously used for nesting as well as those deemed suitable but had no nesting documented in recent years. When plovers exhibited territorial or courtship behavior, the sites were investigated for the presence of nests. If none were found, the territories were revisited every two to seven days in attempts to locate newly initiated nests.

Territory and Nest Protection

Potential and known breeding sites were closed to the public in late March. Each area was surrounded by symbolic fencing and twine. All located nests were protected by predator exclosures. These have been used in the Seashore since 1994.

Nest and Brood Monitoring

Nests were viewed from a distance every one or two days during incubation. Observers noted the behavior of adults, presence of predators and the condition of the predator exclosure. Nests were approached briefly once a week to closely inspect the exclosure, count eggs and search for any predator tracks. After hatching, each brood was monitored at one or two day intervals. Observers noted brood status, behavior, movements, human disturbance, predator contacts or any other environmental interactions.

Results and Discussion

Productivity

Three pairs of Piping Plovers were found at CAHA during the 2001-breeding season (Table 1, Chart 1). This is the lowest breeding population recorded since monitoring began in 1989. Between 1989 and 1996, eleven to fifteen pairs were identified annually. Numbers have declined each year since 1997. This year's low of three pairs represents an 80% reduction from the peak number of fifteen in 1989. The number of sites utilized by breeding birds is also in decline. In 1996, six areas of CAHA supported nesting. In 2000, breeding was found only at two sites. Three sites were used in 2001. These included Cape Point, Hatteras Island spit and Bodie Island spit. This was the first time plovers bred at Bodie Island since 1997.

Sites that have not been used in recent years include South beach on Hatteras Island and the northern and southern tips of Ocracoke Island. One pair nested on neighboring Pea Island Wildlife Refuge. Cape Lookout National Seashore reported a significant decline in breeding pairs in the past three years. Suitable habitat still appears to be present at all sites. However an increase in vegetation and shoreline changes have altered some

sites. Recreational activities along CAHA beaches, including those near existing plover habitat, have risen greatly over the years.

The three CAHA pairs produced three known nests this season (Table 2). One nest (33%) successfully hatched. Two nests (67%) were unsuccessful. The average clutch size was 3.3 eggs per nest. Of the 10 known eggs, three (30%) hatched (Table 3, 3a). Chick production was the lowest on record since monitoring began. Two chicks survived to fledgling age. Fledgling rate was 0.67 chicks per breeding pair (Table 4). Productivity rates between 1989 and 2000 have ranged from 0.2 to 1.3 (Table 4a). The average rate over the past ten years is 0.70. All years have been below the recovery goal set by US Fish and Wildlife Service (USFWS) of 1.5 fledglings per breeding pair. The reduced breeding population we are now seeing is likely a reflection of low productivity over the years. According to USFWS, a population would need to produce 1.2 fledglings per breeding pair annually to sustain a population and higher to increase a population.

One of the three successful nests produced fledglings in 2001. This nest represented an initial nesting attempt by a pair of adults. The two unsuccessful nests late in the season might have been second nesting attempts though no nests were found at these two sites earlier in the season.

Nest Loss/Abandonment

Two nests (67%) were abandoned in 2001. At Bodie Island, red fox *(Vulpes, vulpes)* tracks were found around the predator exclosure for several days prior to nest abandonment. Crows *(Corvus spp.)* were sighted at and on top of this same predator exclosure on the day the nest was abandoned. It is not known if the crows caused the plovers to abandon the nest or appeared afterwards. An egg was inspected three weeks after abandonment and contained a well-developed embryo. The Cape Point nest was abandoned the day after a fox tried to dig around the predator exclosure. Fox tracks were frequently observed at the site before and after the nest was found. The eggs were examined approximately 2 weeks after abandonment. No evidence of embryonic development was found.

Chick Mortality

One chick (33%) was lost to unknown causes. Periods of rain were reported the previous day and may have been a contributing factor. Cat tracks were also found at the site on the same day the chick disappeared. Chick loss was comparatively low at 33% this year. However the sample size in 2001 was the lowest on record. In previous breeding seasons between 1989 and 2001, chick losses ran between 36% and 90% (Wrenn 1990, Collazo 1992-1994, Lyons 1995-2001). In past breeding seasons, the majority of chicks were lost within ten days of hatching. This also proved true in 2001 with the loss of a 3-day old chick (Table 5, Chart 2).

Predator Exclosures

Predator exclosures were erected at all three nests in 2001. Fox homed in on two exclosures located at Cape Point and Bodie Island sites. Tracks were found outside the fences, partially circling the exclosures. Evidence of fox attempting to dig under the fence material was documented on one occasion at Cape Point. At Bodie Island a fox apparently tried to reach its paw inside the fencing. Fox tracks were commonly recorded near both of these nest sites prior to the erection of exclosures. In most cases, tracks were identified as red fox prints. Crows also targeted the exclosure at Bodie Island. On two occasions, they were seen sitting on the top protective netting as well as on the ground outside. Gull *(Laridae)* tracks were once found next to an exclosure as were a set of unidentified small mammal tracks and two sets of human footprints.

Predator exclosures have been used at CAHA for the past eight years. Overall, their use has resulted in higher hatching rates. Between 1995 and 1998 hatch rates have ranged from 75% to 90%. However, in 1999 and 2000, rates were comparatively lower, where half of the exclosed nests (50%) successfully hatched. This season only 33% of were successful. Again, the number of nests and thus the sample size has decreased over the years.

It was hoped that the use of predator exclosures would help boost overall fledgling rates but with few exceptions the rates have been low (Table 4a). Record highs were found in 1998 and 1999, with 1.3 and 1.2 respectively. Food availability studies conducted by CAHA in 1998 showed a five-fold increase in prey compared to a similar study in 1996 (Kuklinski and Fraser, 1996). The use of exclosures in combination with high food availability may have been responsible for increased productivity in 1998. If food availability is a highly variable limiting factor, chick survival may also be highly variable.

Predation

Fox impacted Piping Plover breeding activities in 2001. One late nest initiation and two nest abandonments were linked to fox activity. Red fox, as well as gray fox *(Urocyon cinereoagenteus)* are now known to inhabit both Bodie and Hatteras Islands. Of the two species, red fox are more predaceous and opportunistic in their feeding. They were frequently seen hunting on open beaches. Red fox was first documented in 1996 on CAHA lands along Bodie Island. Initial sightings on Hatteras Island were more recent beginning in late 2000. Fox activity was recorded at all active plover nesting areas in 2001. Most prints appeared to be made by red fox. The canids were more active at Cape Point and Bodie Island spit than Hatteras spit. At Cape Point, the single plover pair exhibited breeding behavior for two months before the initiation of a late season nest was found. Red fox tracks were commonly seen in the plovers' territory throughout the period. It is plausible that fox could have consumed any eggs laid earlier in the breeding season before the staff found them. The eventual abandonment of this nest occurred after a fox tried to dig under the predator exclosure. At Bodie Island, the disappearance of the adult male plover coincided with fox tracks being found around the exclosure. Up to its disappearance, the male was most commonly found incubating the nest. The female intermittently sat on the eggs during the following few days before abandoning the nest all together. It is very possible the male was lost to a fox if it left the exclosure defending the nest. Crows were twice observed on the Bodie Island exclosure, though not on the day the male plover disappeared. Tracks of gulls, domestic dogs *(Canidae)* and two humans were found at nest sites during incubation periods.

It could not be determined if chick loss was due to predation. The loss did coincide with the observation of cat *(Felis domesticus)* tracks within the brood's territory at Hatteras spit. Crows were observed harassing this same brood on several occasions. Mink and additional cat tracks were also found within the brood's territory.

Feral cats have been identified as a threat to Piping Plover as well as to other beach nesting birds at CAHA. A contract biologist has been live trapping cats since March of 2000. Evidence of cat activity declined at Cape Point this season.

Dog Disturbance

Unleashed dogs may have caused courting plovers to desert South Ocracoke flats. On one occasion two plovers were seen exhibiting false nesting behavior and running into adjacent dune. This was the first time in the 2001-breeding season that an apparent pair were observed on this site. Two unleashed dogs ran into the bird closure flushing the plovers. The bird pair was not seen again during the breeding season. Dog tracks were found in all plover nesting sites this year

Human Disturbance

Evidence of human entry was found at all plover breeding sites. Pedestrian and vehicle entries in bird nesting areas were recorded from May through September of 2001. These areas were not exclusively used by Piping Plover but also by American Oystercatcher, Black Skimmer and various species of terns. Disturbance observations are conservative since they were not made continuously throughout the Seashore and some incidents involved more than one pedestrian or vehicle. Most were not witnessed but documented based on tracks left behind. A total of 63 incidents were recorded of off-road vehicles entering posted bird closures. This number is similar to the 58 vehicle entries documented in 2000. Of the 63 incidents reported in 2001, 33 occurred on Bodie Island, 21 on Hatteras Island and nine on Ocracoke Island. These incidents required, at minimum, repairs to twine tied between posts but often involved the replacement of broken posts and signs. Two hundred forty-seven pedestrians illegally entered the bird closures compared to 56 incidents recorded last year. In part, this increase reflects more thorough documentation. In 2001, 148 occurred on Bodie Island, 95 on Hatteras Island and four on Ocracoke Island. Contacts were made with several people found defecating within the posted area. Judging by the amount of human feces and toilet paper left behind, this was one of the main reasons people entered the closures. Other people contacted said they thought the closures were only for ORVs though the signs clearly stated pedestrian entry was also prohibited. Each entry required visitors to lift and bend under string that connected all posted signs.

Conclusion

The reduced number of breeding Piping Plover within CAHA is significant. In addition, only half of the sites previously used for breeding supported nesting plovers in 2001. These same trends are being seen throughout the coast of North Carolina as well as southern Virginia.

Fledgling rates still remain below what the US Fish and Wildlife Service seeks for Piping Plover recovery. CAHA has engaged in a more aggressive program to reduce feral cat populations. This effort needs to continue in order to be effective. Other problem animals that have learned to target nesting birds should be addressed. Fox present a significant problem since they have homed in on predator exclosures around nests. This may be the time to consider control measures, especially on Hatteras Island while their population is still small. Electric fencing around the outside of predator exclosures has been effective in some regions. Testing their worth at CAHA may prove beneficial. Human disturbances still exist. Though bird closures are clearly marked, pedestrians or vehicle operators do not always respect the posted areas. Visitors need to be made more aware of their potential impacts - direct and indirect. The leash law is not consistently enforced in all areas of CAHA. A greater law enforcement presence, along with written citations would help as recreational uses continue to increase each year. Surveys in the non-breeding season should continue to learn where and to what degree plovers use CAHA in the non-breeding season.

One research need identified is intensive monitoring of broods during the first few critical days after hatching when the majority of chicks are lost to unknown causes. Another possible project involves comparing egg and chick weights in the southern breeding range to those further north where fledgling rates are higher. The results may reflect on the vigor of the adults at time of breeding.

Individual Nest Summaries

Bodie Island Spit, Oregon Inlet

A single adult was seen at the site foraging at the tidal cove between 5/16 and 5/23. A scrape was found on 5/16 but no other breeding behavior was observed. One pair arrived and exhibited territorial and courtship behavior beginning on 6/19. The pair produced one late season nest in the southwest section of the established closure. The abandonment of the nest coincided with fox and crow activity at nest. Productivity at Oregon Inlet was 0.00 per breeding pair.

Pair 2, Nest 2
35°46.703 075°32.268

6/27/01	Nest with 1 egg was located; fox tracks found in closure very near to nest; predator exclosure was erected on incomplete nest due to high fox activity in area.
6/28/01	Male observed on egg; fox tracks found leading within two feet of the predator exclosure.
6/30/01	Two eggs present; male incubating eggs; several fox tracks in closure but not near predator exclosure.
7/02/01	Three eggs in nest.
7/03/01	Ranger reported seeing a crow on top of mesh roof of predator exclosure.
7/07/01	Pedestrian tracks lead within 20 feet of predator exclosure.
7/15/01	Fox tracks found leading up to predator exclosure; male observed incubating more often than female.
7/16/01	No incubating adult observed in AM; nest was approached revealing three eggs; fox tracks were found circling and reaching into the predator exclosure; two sets of pedestrian tracks leading up to predator exclosure; female observed on nest in PM.
7/17/01	No incubating adult observed in AM; one set of fox tracks around predator exclosure; female was observed on nest in PM but no sign of male in area; male was not seen after this date.
7/18/01	No adults observed in AM; one set of fox tracks around predator exclosure. Female was observed on nest in PM but again no sign of male; six to seven migrating piping plovers observed at tidal cove.
7/19/01	No adult was found on nest. Crows were near the exclosure and on top of mesh roof of exclosure. Adult plover landed a distance from exclosure. Observed false nesting and doing head bobs, apparently directed toward crows (could not discern if bird was male or female of pair). Fox tracks were found in general area. Adult female, or a migrant seen on the shoreline of the cove. Nest may be abandoned after 17 days of incubation.
7/20/01	No adults were observed on nest for past two days; nest assumed abandoned; one plover was seen on shoreline of cove, may have been adult from this pair or migrant.
7/22/01	No adults were observed on nest: three eggs half-buried in sand; past high tide washed over exclosure and strong NE winds blowing over the last two days. Fox tracks found leading up to, halfway around, and away from predator exclosure.
8/11/01	Predator exclosure was taken down; only 1 egg remained in nest; upon inspection dead embryo was well developed, included pin feathers.

Cape Point

Two to four adult plovers were seen exhibiting courtship and/or territorial displays in the established closure between 5/01/01 and the week of 7/01/01. Two birds were identified as a breeding pair while the two others appeared unpaired. After early July, only the one pair was sighted. One late season nest was found at Cape Point. Red fox tracks were frequently found throughout their territory and likely destroyed any early eggs laid before a single egg was found on 6/30/01. The one nest was abandoned. Productivity rate at Cape Point was 0.00 this season.

Pair 3, Nest 3
35°13.459 75° 31.913

6/30/10	Nest found with one egg; predator exclosure erected on incomplete nest due to heavy fox traffic in area; one plover returned to nest after 30 minutes.
7/02/01	Two eggs in nest: both parents seen incubating; fox and gull tracks within two feet of predator exclosure; fox prints circled halfway around exclosure.
7/03/01	Three eggs in nest; fox tracks observed at exclosure.
7/12/01	Small mammal tracks (possibly cat or fox) at exclosure.
7/13/01	Fox tracks with evidence of some digging around exclosure.
7/14/01	No incubating adult present at nest; one adult seen foraging in nearby tidal ponds.
7/15/01	Again no adult at nest; single adult foraging at tidal ponds; no evidence of digging or other disturbance at nest; four crows in area.
7/16/01	No adults present in area; nest abandoned since 7/14; adults had incubated nest for 14 days before abandonment.
8/1/01	Eggs were inspected, no embryonic development present.

South Beach

No nesting occurred in the vicinity of the drain pool for second consecutive year. A single bird was seen foraging in the surf zone here on two occasions (6/11 and 6/17).

Hatteras Island Spit, Hatteras Inlet

One pair and a single adult spent the breeding season within the established bird closure. Territorial behavior was observed beginning 5/16/01. One pair produced one nest that successfully hatched. Of the three chicks, two fledged. Productivity at Hatteras spit was 2.0 chicks per breeding pair.

Pair 1; Nest 1
35° 11.327; 75° 45.294

6/05/01	Nest with four eggs found on south side of pond at edge of dunes, near but not in vegetation, incubating adult present.
6/06/01	Predator exclosure erected; adult returned to eggs within four minutes; second adult nearby.
6/16/01	Exclosure checked for predator tracks; none found.
6/23/01	Three of four eggs hatched; one chick running near nest; two chicks in nest with adult; adult performed broken wing display when approached.
6/24/01	Adults present; defensive behavior exhibited toward a third adult in area; chicks not observed by likely present due to adult behavior; rainy weather.

6/25/01	Two chicks sighted. One chick (3 days old) assumed lost to unknown causes though cat tracks were found in vicinity of nest site: inclement weather on previous day may also have contributed to chick loss; remaining chicks feeding in unvegetated flats south side of pond, 50-100 meters from nest.
6/27/01	Cat tracks again found at site. Brood foraging closer to pond and in grassy site west of pond.
6/29/01	Single egg still in nest; fresh human footprints around predator exclosure; conflicts between Pair 1 and a third unpaired adult continue.
6/30/01	Adults chased crows away from brood several times.
7/12/01	Unhatched egg gone from nest and predator exclosure, no evidence left in nest except a pile of sand (ghost crab?).
7/14/01	Mink tracks found in area; brood moved to northeast side of pond between dunes and grass flats.
7/16/01	Adults chased crow out of area.
7/18/01	Cat and fox tracks observed; brood foraging on flats on all sides of pond; chicks exercising wings.
7/20/01	One chick (28 days old) seen flying short distances; adults chased crow.
7/21/01	Both chicks fledged; five migrants seen in area.
7/25/01	Adults and fledglings were not observed; group may have migrated.

Ocracoke Island Spit, Ocracoke Inlet

One to three foraging plovers were seen during observations between 5/16 and 6/4. Birds did not exhibit any territorial or courtship behavior. On 6/14 an apparent pair were seen false nesting and running into a dune adjacent to soundside flats. Two unleashed dogs ran through the area flushing the birds from the site. No nest was found upon inspection. A single bird was observed foraging on the flats on 6/23. No activity was observed thereafter.

Submitted by Marcia Lyons
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February, 2002

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Table 1. Number of Piping Plover breeding pairs by site in Cape Hatteras National Seashore (1985-2001)

	Total	**Sites within Cape Hatteras National Seashore**					
	Pairs	Oregon Inlet	Cape Point	South Beach	Hatteras Inlet	North Ocracoke	South Ocracoke
1985	9						
1987	10	0	4	0	4	1	1
1989	15						
1990	14	0	8	0	4	2	0
1991	13	0	5	0	3	5	0
1992	12	0	4	0	4	4	0
1993	12	0	5	1	3	3	0
1994	11	0	5	1	3	2	0
1995	14	0	6	1	4	2	1
1996	14	1	5	1	5	1	1
1997	11	1	4	1	3	0	2
1998	9	0	4	1	3	0	1
1999	6	0	3	1	1	0	1
2000	4	0	2	0	2	0	0
2001	3	1	1	0	1	0	0
average	11.2						

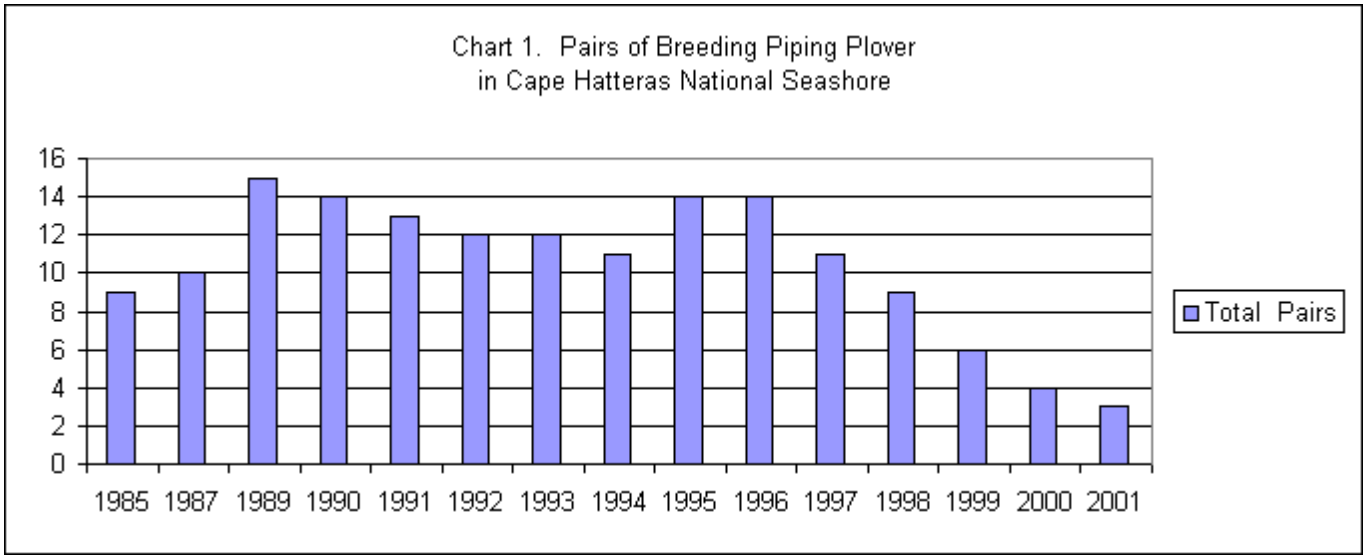

Table 2. 2001 Piping Plover nesting season at Cape Hatteras National Seashore

LOCATION	#BREEDING PAIRS	#NESTS	#NESTS HATCHED	#NESTS LOST	#CHICKS FLEDGED	#CHICKS LOST
BODIE IS. SPIT	1	1	0	1	0	0
CAPE POINT	1	1	0	1	0	0
SOUTH BEACH	0	0	0	0	0	0
HATTERAS IS. SPIT	1	1	1	0	2	1
OCRACOKE NORTH	0	0	0	0	0	0
OCRACOKE SOUTH	0	0	0	0	0	0
TOTAL	3	3	1	2	2	1

Table 3. 2001 Piping Plover hatching success on Cape Hatteras National Seashore

LOCATION	# NESTS	# EGGS (a)	NESTS ABANDONED / LOST #	%	NESTS HATCHED #	%	EGGS HATCHED #	% (a)	NESTS W/ FLEDGED CHICKS #	%
BODIE IS. SPIT	0	3	1	100%	0	0%	0	0%	0	0%
CAPE POINT	1	3	1	100%	0	0%	0	0%	0	0%
SOUTH BEACH	0	0	0	0%	0	0%	0	0%	0	0%
HATTERAS IS. SPIT	1	4	0	0%	1	100%	3	75%	1	100%
NORTH OCRACOKE	0	0	0	0%	0	0%	0	0%	0	0%
SOUTH OCRACOKE	0	0	0	0%	0	0%	0	0%	0	0%

(a) -includes all eggs found

Table 3a. Piping Plover hatching success on Cape Hatteras National Seashore for the past ten years.

YEAR	# NESTS	# EGGS	NESTS ABANDONED / LOST #	%	NESTS HATCHED #	%	EGGS HATCHED #	%(a)	NESTS W/ FLEDGED CHICKS #	%
2001	3	10	2	67%	1	33%	3	30%	1	33%
2000	6	23	3	50%	3	50%	10	44%	2	33%
1999	6	23	3	50%	3	50%	11	48%	3	50%
1998	8	31	2	25%	6	75%	20	65%	5	63%
1997	16	47(b)	6	38%	10	63%	32	68%	2	13%
1996	16	56(b)	6	38%	10	63%	30	53%	2	13%
1995	19	63	6	32%	13	68%	30	48%	6	32%
1994	18	65(c)	8	44%	10	56%	32(d)	49%	6	33%
1993	21	69	12	57%	9	43%	27	39%	5	24%
1992	14	49(e)	6	43%	8	57%	17	35%	6	43%

(a) - of all known eggs

(b) - assumes 1 egg from a brood whose nest was not found

(c) - assumes 2 eggs from a brood whose nest was not found (see 1992 report)

(d) - includes those presumed hatched (see 1994 report)

(e) - assumes 3 eggs from a brood whose nest was not found (see 1992 report)

Table 4. Fledging success of piping plovers on Cape Hatteras National Seashore for 2001.

LOCATION	# PAIRS	# BROODS	# CHICKS	AVE. BROOD SIZE chicks/brood	CHICKS FLEDGED #	CHICKS FLEDGED %	BROODS WITH CHICKS FLEDGED #	BROODS WITH CHICKS FLEDGED %	FLEDGE RATE chicks/pair
OREGON INLET	1	0	0	0.0	0	0%	0	0%	0.00
CAPE POINT	1	0	0	0.0	0	0%	0	0%	0.00
SOUTH BEACH	0	0	0	0.0	0	0%	0	0%	0.00
HATTERAS INLET	1	1	3	3.0	2	67%	1	100%	2.00
NORTH OCRACOKE	0	0	0	0.0	0	0%	0	0%	0.00
SOUTH OCRACOKE	0	0	0	0.0	0	0%	0	0%	0.00
Total	3	1	3	3.0	2	67%	1	100%	0.67

Table 4a. Fledging success of Piping Plovers on Cape Hatteras National Seashore for the past ten years.

YEAR	# PAIRS	# BROODS	# CHICKS	AVE. BROOD SIZE chicks/brood	CHICKS FLEDGED #	CHICKS FLEDGED %	BROODS WITH CHICKS FLEDGED #	BROODS WITH CHICKS FLEDGED %	FLEDGE RATE chicks/pair
2001	3	1	3	3.0	2	67%	1	100%	0.67
2000	4	3	10	3.3	3	30%	2	67%	0.75
1999	6	3	11	3.7	7	64%	3	100%	1.20
1998	9	6	20	3.3	12	60%	5	83%	1.33
1997	11	10	32	3.3	3	9%	2	20%	0.27
1996	14	10	30	3.0	3	10%	2	20%	0.21
1995	14	13	30	2.3	7	23%	6	46%	0.50
1994	11	10(a)	32(b)	3.2	9	30%	6	60%	0.82
1993	12	9	27	3.0	8	30%	5	56%	0.67
1992	12	8	17	2.1	8	47%	6	75%	0.67

(a) - includes 2 broods whose nest was presumed hatched (see 1994 report).
(b) - includes 8 chicks from 2 nests that was presumed hatched (see 1994 report).

Table 5. Age distribution of Piping Plover chick mortality on Cape Hatteras National Seashore (1990-2001)

	Age (days)																								
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	Total
1999	2			1																					3
1998	2	1				2	1		1													1			8
1997	2	3	5	5	1	1	4				1	1	1	2	1			2							29
1996	4	8	2	4	1			3			2	1												1	26
1995		7	2	2	3	1	2	1		1	1	1													21
1994	2		6					1	1	2					1	1		1							15
1992		2	1	2	2	2			1				1					1							12
1991			1	2	1	1	3	5	2	1							3								19
1990	3	1	2	4	1	1	2	1			2	2		1											20
2000	1		2	1							1														5
2001		1																							1
1990-2001	16	22	21	21	9	8	12	11	5	4	7	5	2	3	2	1	3	4	0	0	0	1	0	1	

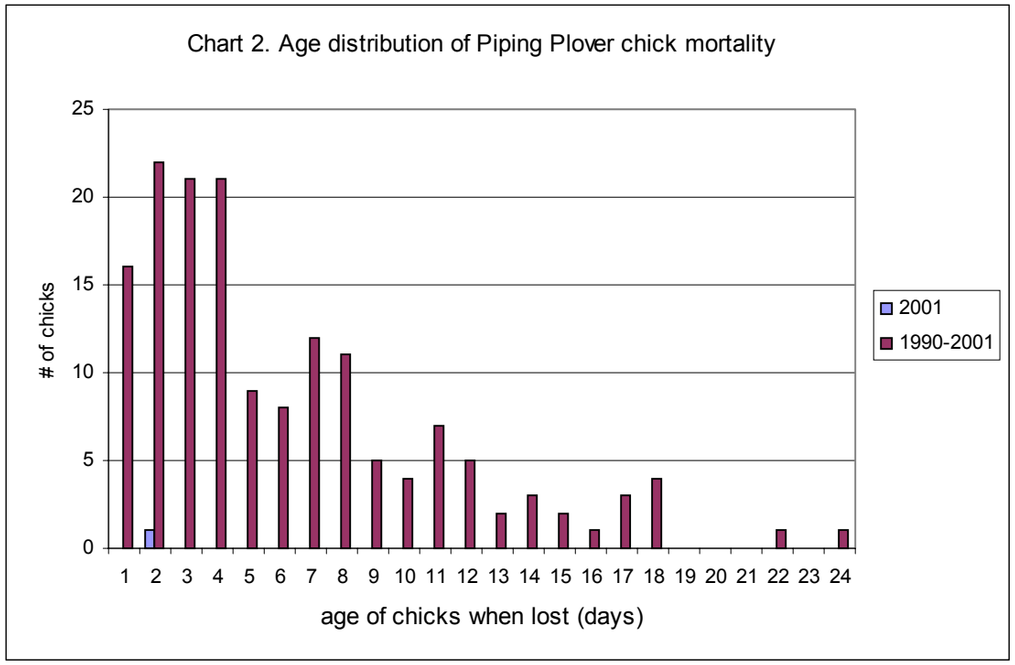
Chart 2. Age distribution of Piping Plover chick mortality
# of chicks
0
5
10
15
20
25
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
age of chicks when lost (days)
2001
1990-2001